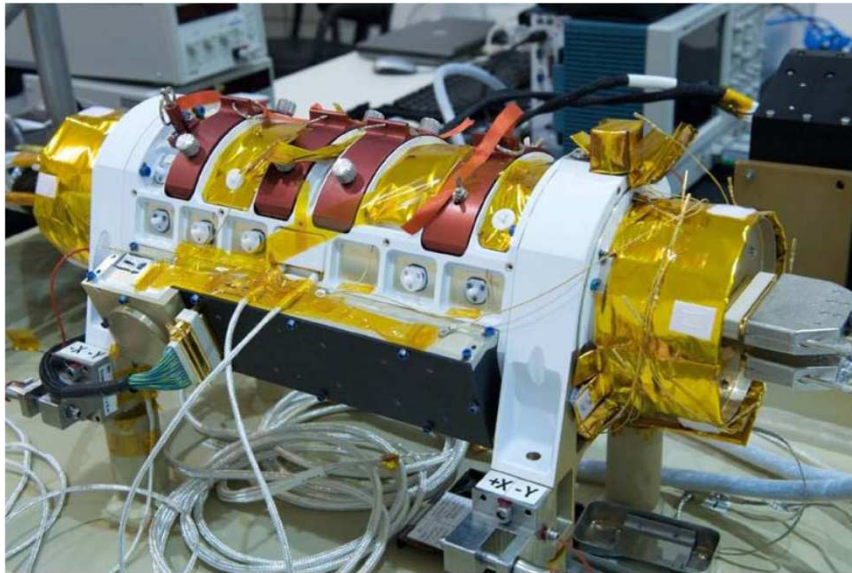


ScaRaB-3 on the Megha-Tropiques mission

A quick introduction



Rémy Roca and the MT Mission group

Successfully launched October
12th 2011 !

Outline of the presentation



The Megha-Tropiques mission

The ScaRaB-3 instrument on board Megha-Tropiques

The instrument and the sampling

Main science objectives (including instrumental synergy)

What's up since we met in Paris ?

Celebrated 25 years of ScaRaB

Monthly mean considerations using GERB

Unfiltering

Coincidence campaign

Geo and cloud from geo

Exploring science activities

The products that are anticipated

L1'

L2,L2b

L4

MTTM etc...

Production Status at ICARE

Plans for short term future

The Megha-Tropiques mission

Overview



Indo-french mission realized by

The Indian Space Research Organisation (ISRO) and the
Centre National d'Etudes Spatiales (CNES)

Megha means cloud in sanskrit and tropiques means tropics in french

Dedicated to the

Water and energy cycle in the Tropics

Low inclination on the equator (20°);

867 km height

High repetitivity of the measurements

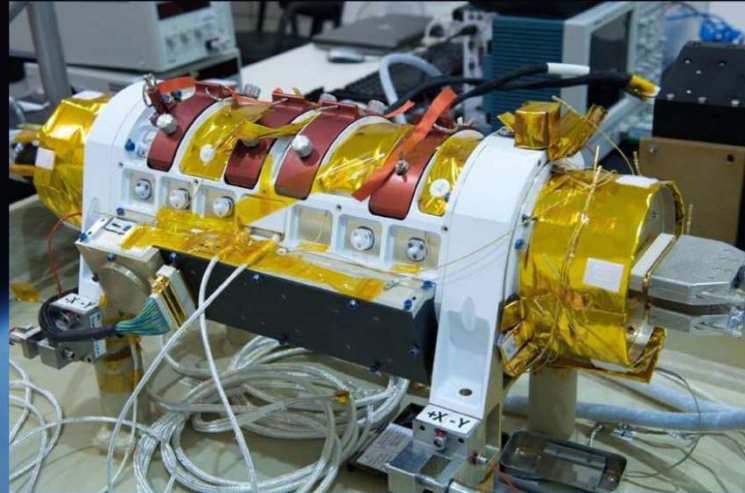
WEB site <http://megha-tropiques.ipsl.polytechnique.fr>

The Megha-Tropiques mission

Payloads



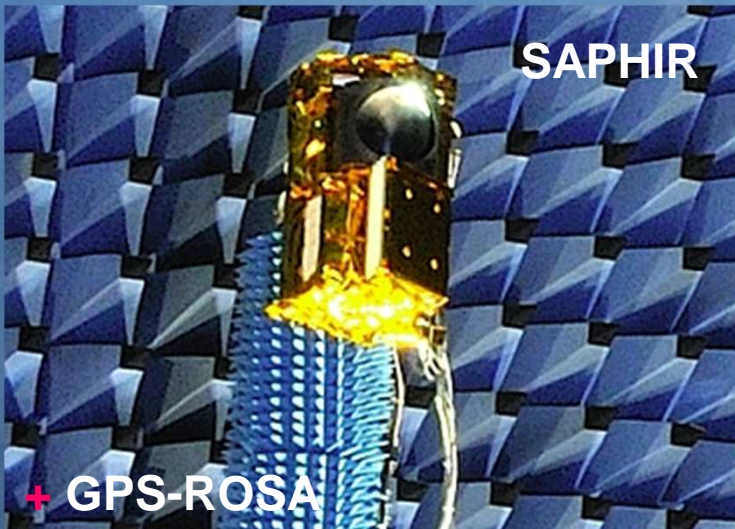
SCARAB



MADRAS



SAPHIR



+ GPS-ROSA



+ the ring of the 5 GEO satellites

Courtesy CNES

The Megha-Tropiques mission

Scientific objectives



Atmospheric energy budget in the intertropical zone and at system scale (radiation, latent heat, ...)

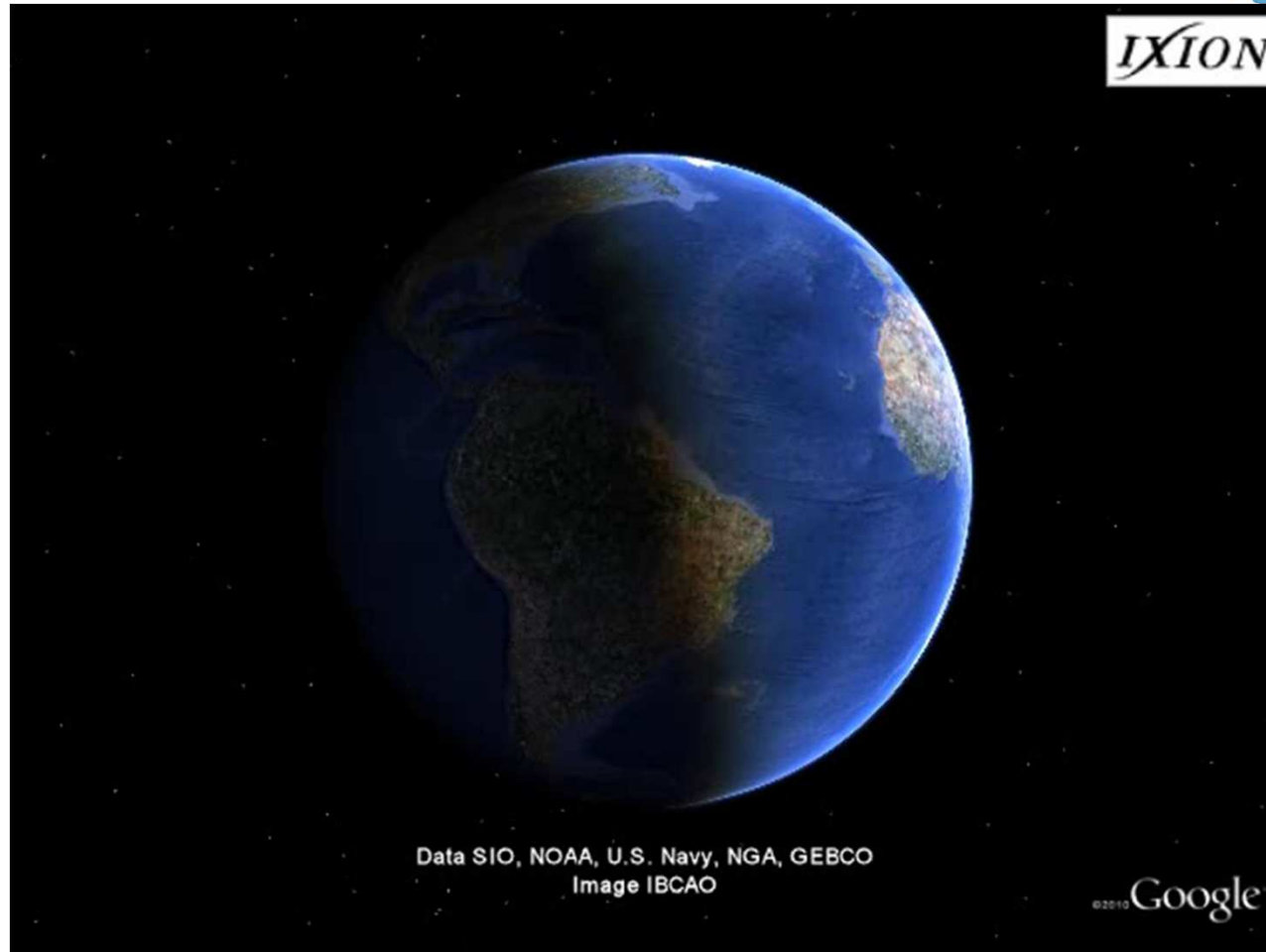
Life cycle of Mesoscale Convective Complexes in the Tropics (over Oceans and Continents)

Monitoring and assimilation for Cyclones, Monsoons, Mesoscale Convective Systems forecasting. **NRT Activities**

Hydrometeorology, flood analysis/forecasting

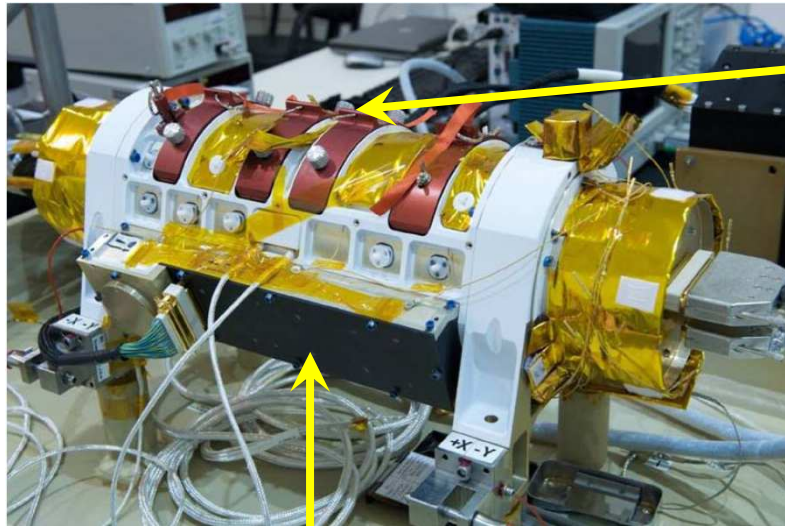
The Megha-Tropiques mission

An equatorial orbit



Courtesy M. Capderou & K. Ramage

The ScaRaB instrument



Calibration module

22 kg, 52 cm width, 40 watts
4 telescopes (in red)

- 2 main channels (# 2 & 3, broad band)
- 2 auxiliary channels (# 1 & 4 narrow band)
- Cross track scanning (2300 km swath)
- 40 km resolution at nadir

ScaRaB goal : To determine the longwave and shortwave outgoing fluxes observations at the TOA.

Presentations
To follow from
Nadia Karouche
and Alain Rosak

Channel	Description	Spectral Interval	Filter
1	VIS (visible)	0.55 – 0.65 μm	Interferential
2	SW (or solar)	0.2 – 4 μm	Silice filter
3	T (total)	0.2 – 100 μm	No filter
4	IR (Infrared)	10.5 – 12.5 μm	Interferential

$$L_{\text{LW}}(\text{daytime}) = L_{\text{TOTAL}} - A' \times L_{\text{SW}}$$

A' depends on the spectral response
of T and SW channels

What 's up since we met in Paris ?



Workshop CERES/GERB/SCARAB Paris, Septembre 2010

What 's up since we met in Paris ?



ISRO-CNES

Laboratoire de Météorologie Dynamique (LMD)

25 ans de ScaRaB

de la tundra à la mousson



We celebrated 25 years of ScaRaB !

© cnes - labo Photon/M Regy

What 's up since we met in Paris ?

Monthly means analysis using GERB

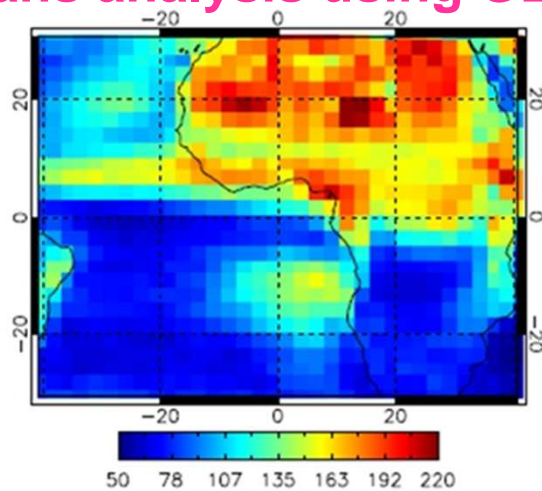


Figure : GERB means for SW fluxes between June 21 & August 10, 2006

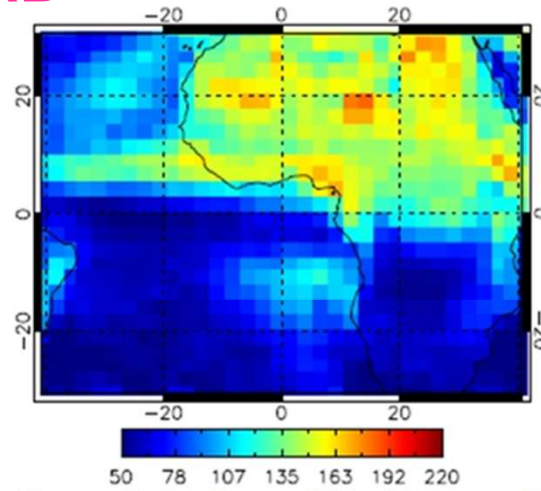


Figure : ScaRaB on a MT orbit means for SW fluxes between June 21 & August 10, 2006

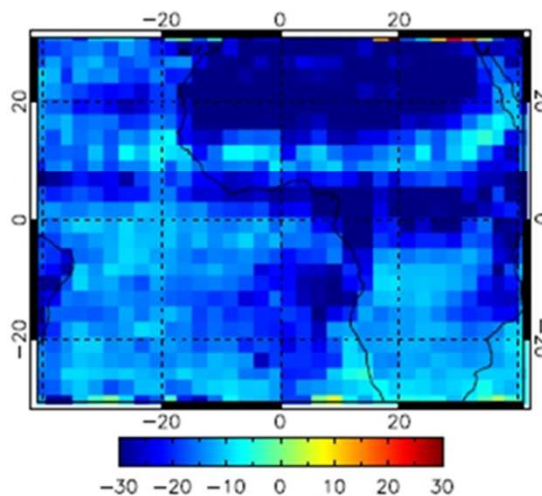


Figure : Difference between ScaRaB and GERB Sw fluxes means between June 21 & August 10, 2006

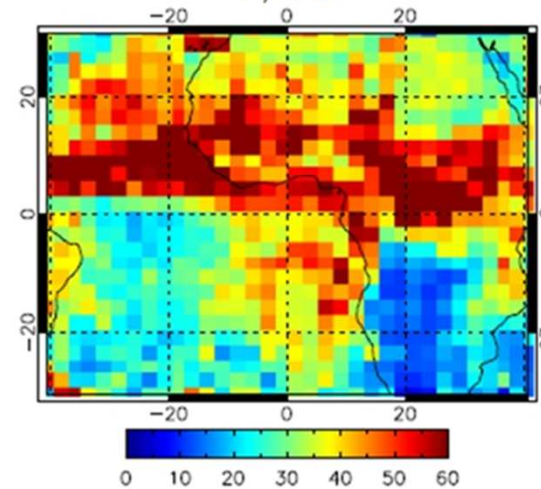
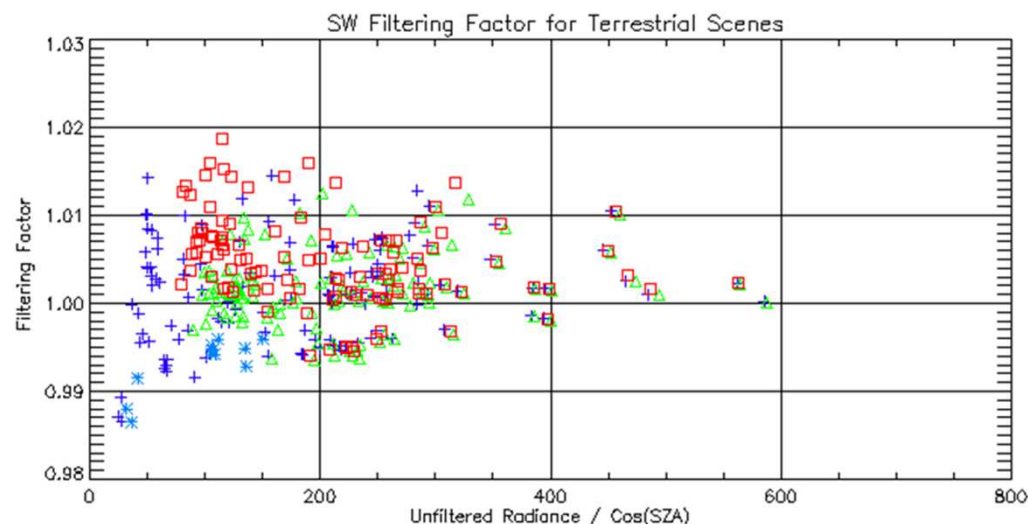


Figure : **RMS** of the difference between ScaRaB on a MT orbit means for SW fluxes between June 21 & August 10, 2006

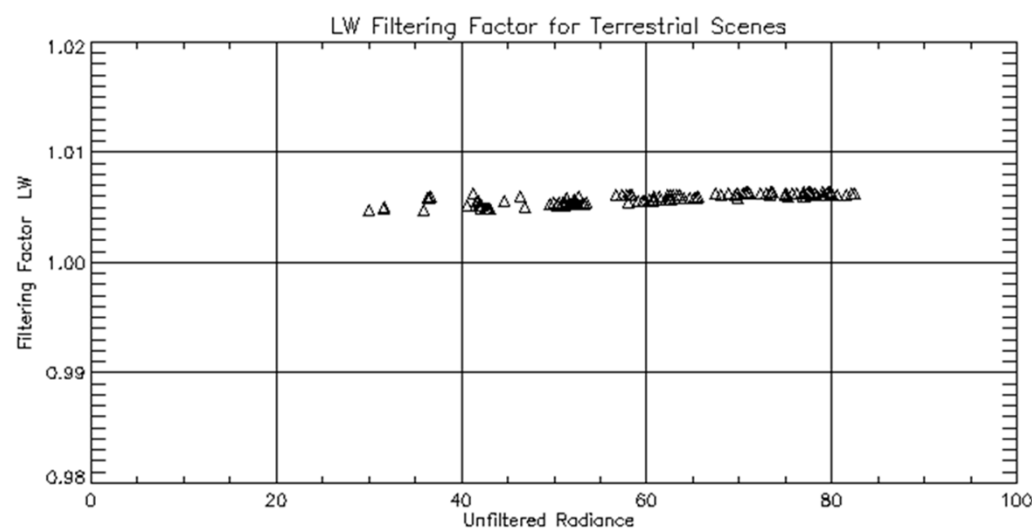
What 's up since we met in Paris ?

Unfiltering of the radiances



Blue star : clear ocean
Blue cross:cloudy ocean
Green: vegetation
Red : desert and cloud

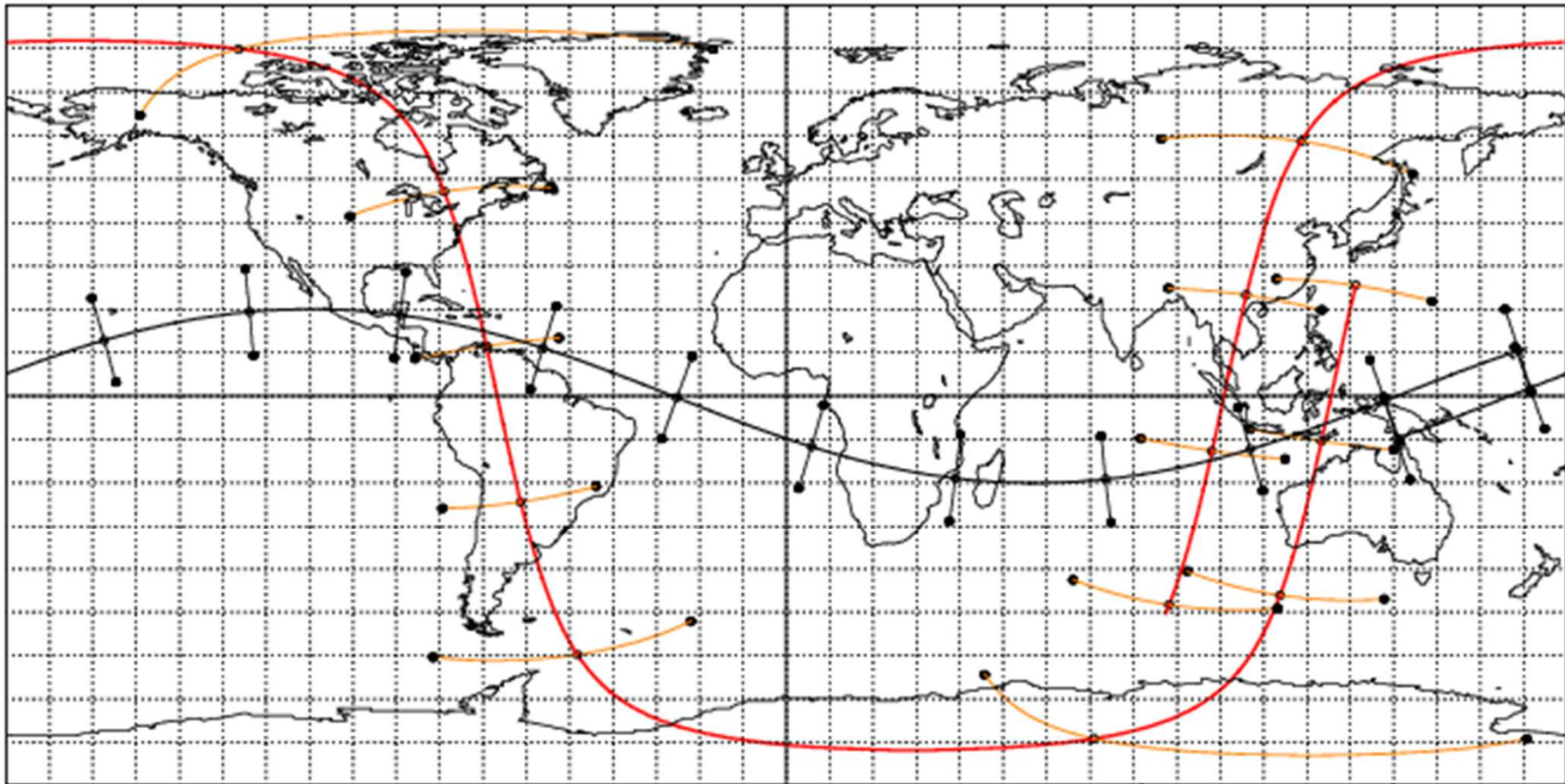
~1% for ocean



Courtesy of Patrick Raberanto

What 's up since we met in Paris ?

Coincidence campaign using CERES and the PAPS mode



Courtesy M. Capderou

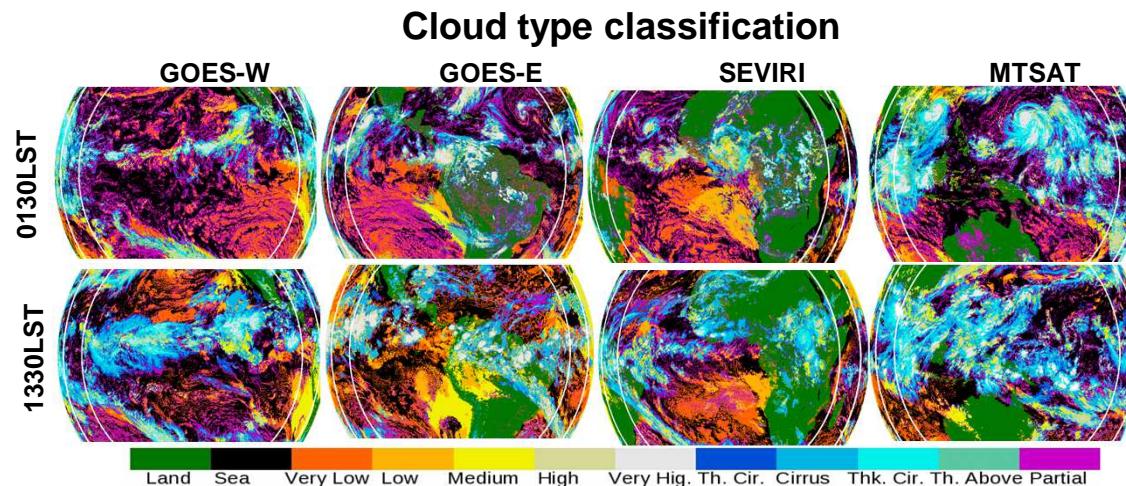
Details and first results in the presentation of Olivier later on this morning

What 's up since we met in Paris ?

Cloud masks and properties from GEO: validation with CALIOP

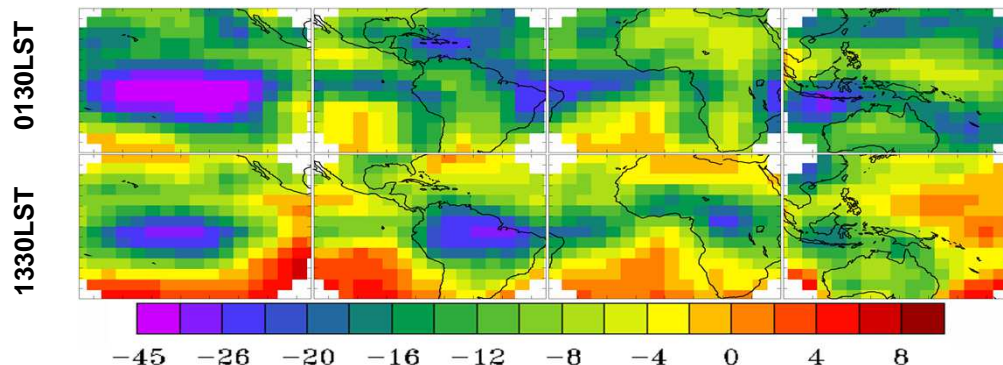


- The elaboration of coherent cloud mask, cloud type classification and cloud top pressure maps with a high spatial and temporal resolution in the tropics using geostationary satellite data (GOES-E, GOES-W, MTSAT and SEVIRI/Meteosat) and the SAFNWC algorithm.
- An evaluation of these clouds fields: comparison of cloud cover, cloud cover types and cloud top pressure with CALIOP lidar data. Use of mean and instantaneous statistics (*G. Sèze et al., to submit to QJRMS*)

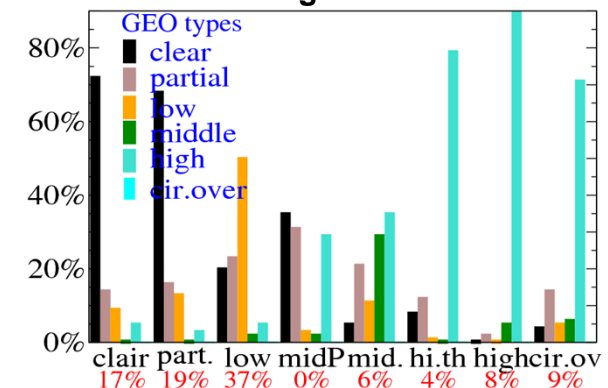


**Geneviève
Sèze et al.**

GEO minus CALIOP cloud occurrence – 1 June – 30 September 2009



GOES-W – night-time - ocean



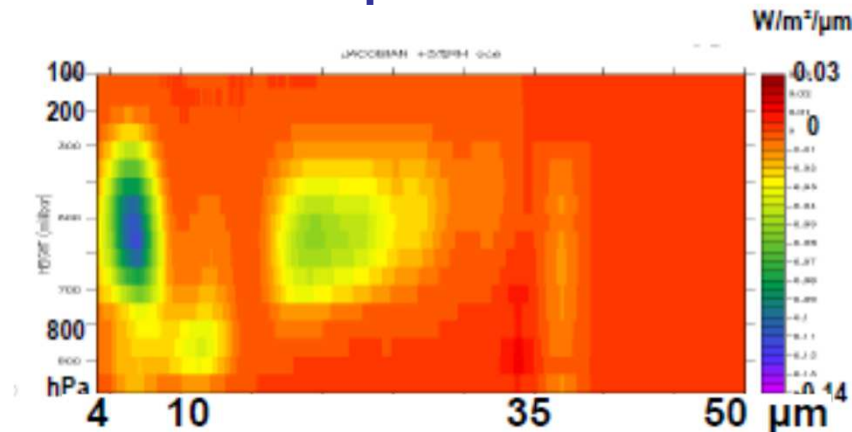
CALIOP cloud types

What 's up since we met in Paris ?

Exploring some scientific questions using CERES !

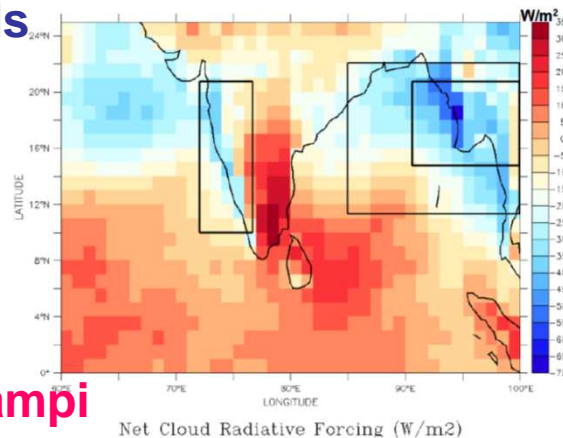


Water vapor and OLR



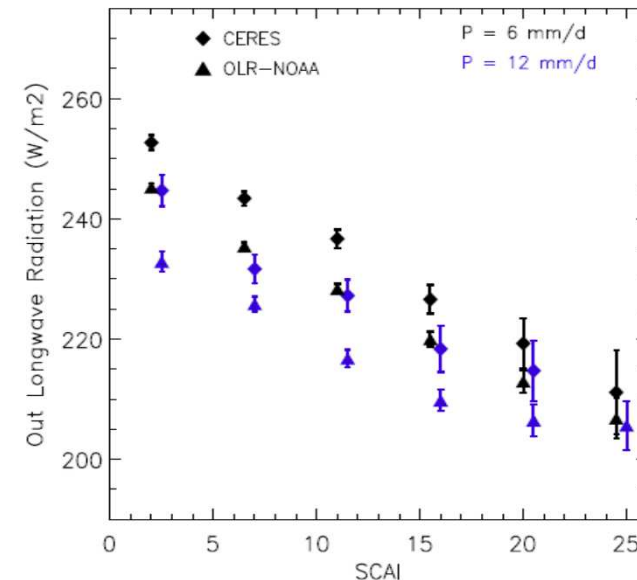
Talk by Rodrigo Guzman

Negative Cloud radiative forcing and high clouds



Talk by Bijoy Thampi

Agregation of convection and OLR



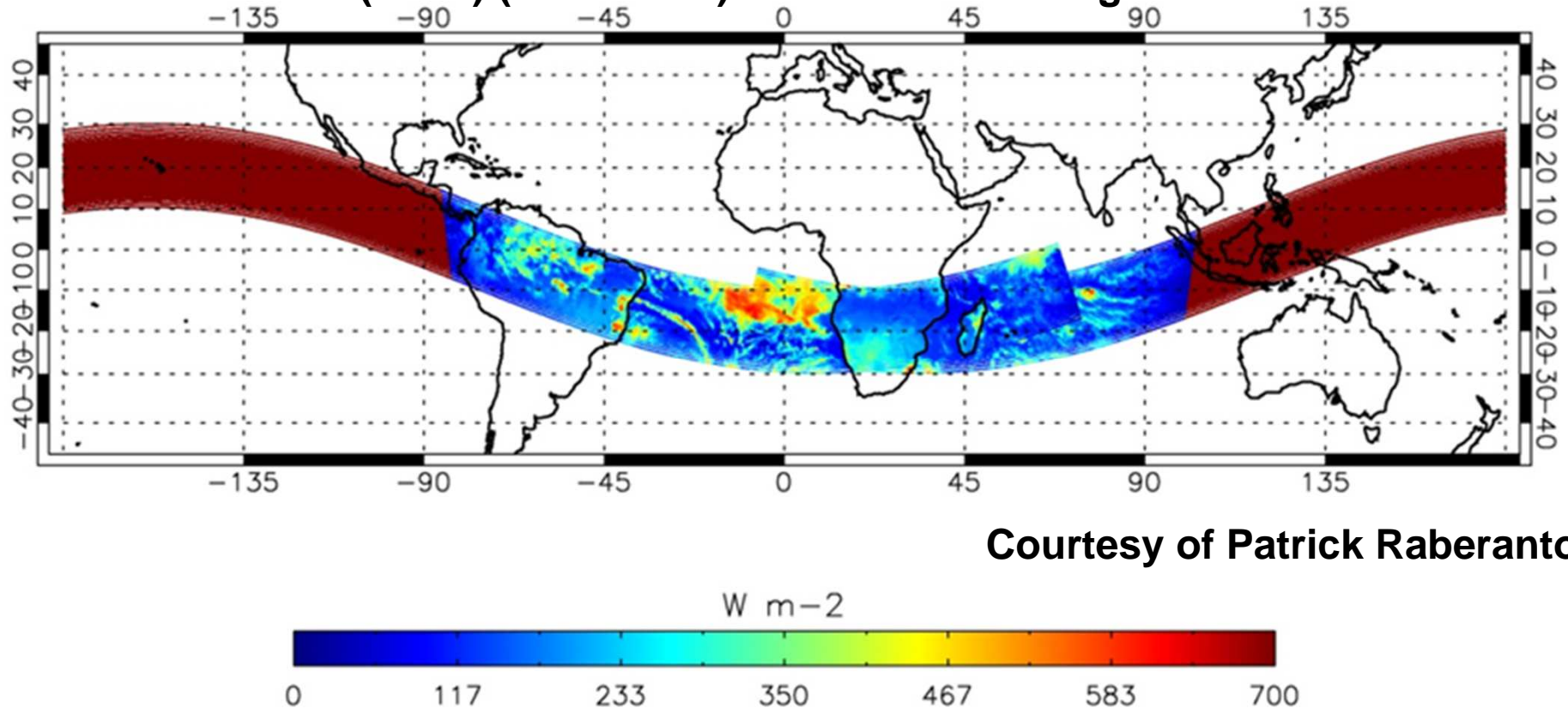
Tobin, Bony and Roca, J Clim, 2012
this issue

The products that are anticipated

Level 2: Flux at the TOA



SW Flux at TOA (Wm^{-2}) (2012/09/01) Neural network algorithm



Courtesy of Patrick Raberanto

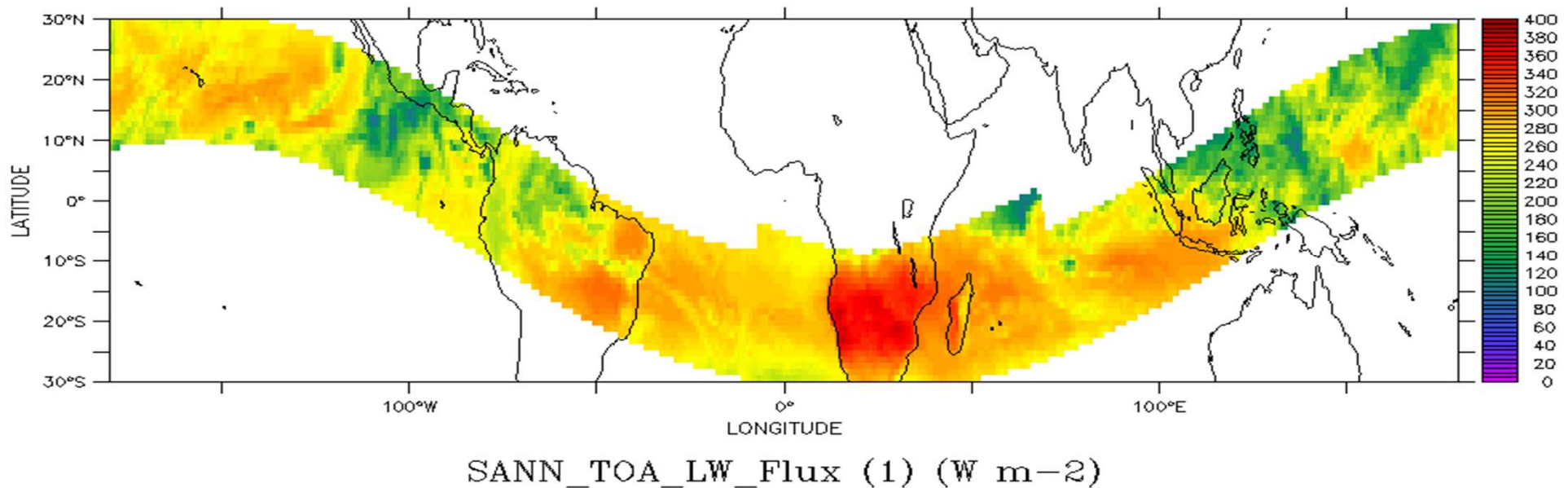
Viollier, M., C. Standfuss, O. Chomette, and A. Quesney (2009), Top-of-Atmosphere Radiance-to-Flux conversion in the SW domain for the ScaRaB-3 instrument on Megha-Tropiques. J. Atmos. Oceanic Technol., 26, 2161-2171.

The products that are anticipated

Level 2b: Flux at the TOA



LW Flux at TOA (Wm^{-2}) $1^\circ \times 1^\circ$ (2012/09/01) Neural network algorithm



Courtesy of Patrick Raberanto

The products that are anticipated

Production Status at ICARE



French DAY 1 MT STATUS			Algorithm Name	Instrument	Scientific code	Oper. code	Data production
Level 2 (instantaneous) includes the unfiltered L1							
TOA radiative products							
SW and LW fluxes, Unfiltered radiances, Albedo	SEL	ScaRaB					
SW and LW fluxes, Unfiltered radiances, Albedo	SANN	ScaRaB					
SW and LW fluxes, Albedo 1°x1°	SANN	ScaRaB					
Level 4 (composite)							
MCS composite							
Composite live cycle of MCS (radiation)	LMD LTHE-SANN	SANN-SCARAB+GEO*					

* all available platforms

Courtesy of Sophie Cloché and the ICARE Bureau

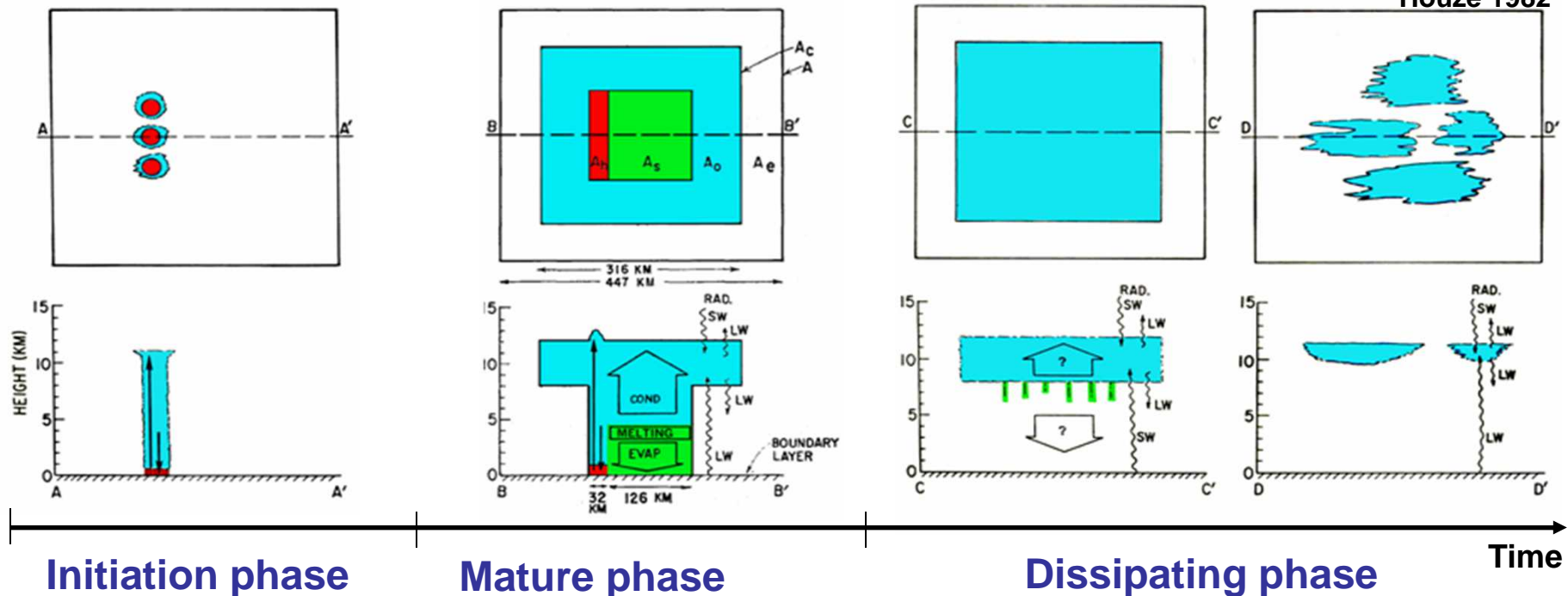
More info at <http://www.icare.univ-lille1.fr/mt/>

The products that are anticipated

Level 4: MCS life cycle composite tropics-wide



Conceptual life cycle of an MCS



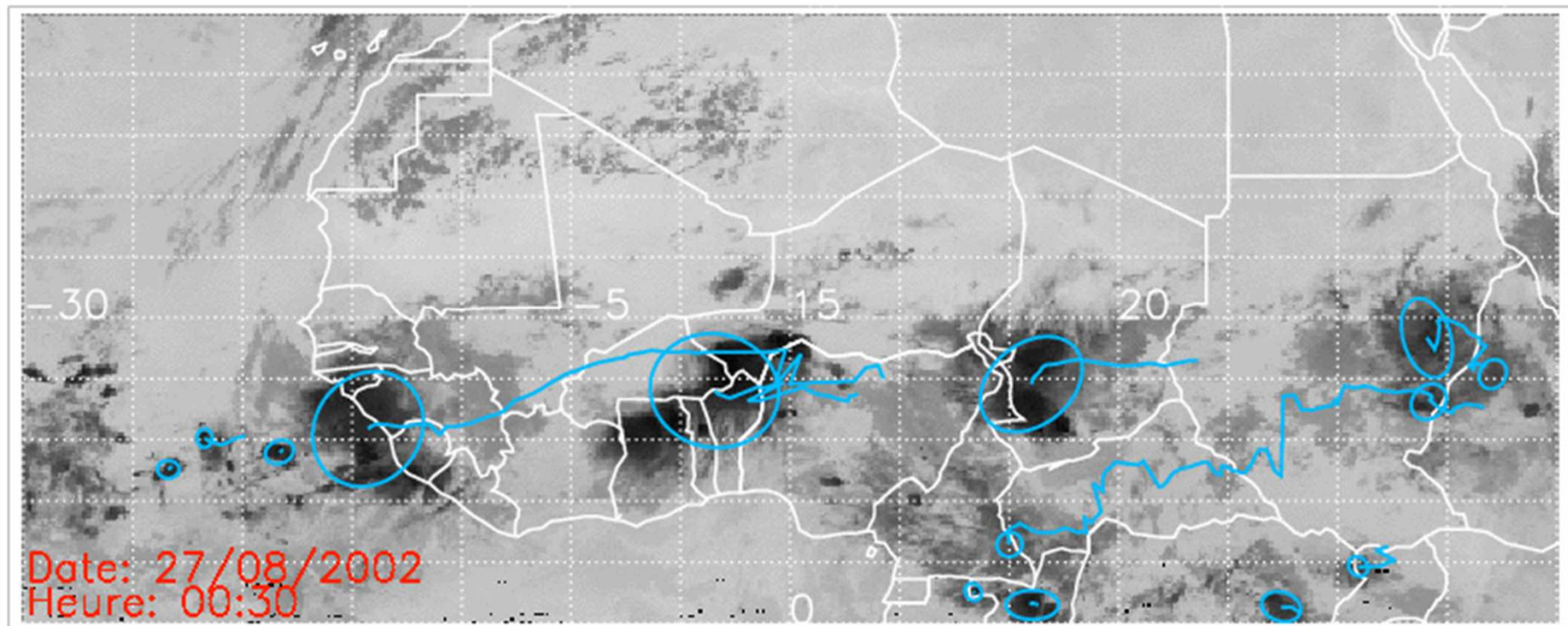
Revisit this model

Put numbers on the duration and the MCS properties along time

Object oriented approach no more static but including the storm dynamics

The products that are anticipated

Level 4: MCS life cycle composite tropics-wide



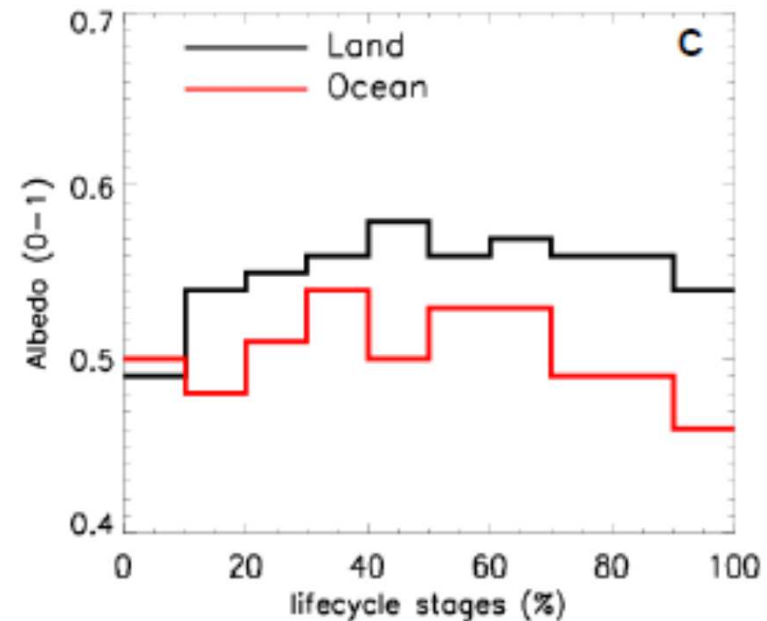
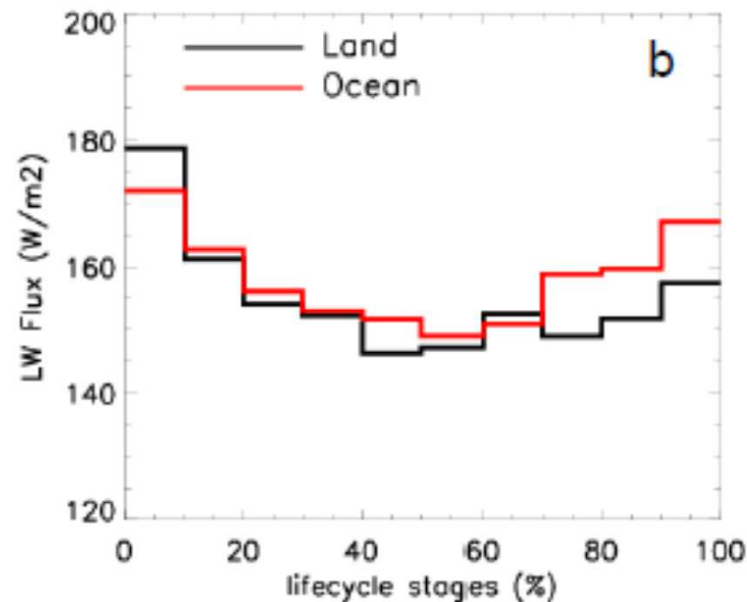
Courtesy T. Fiolleau

The products that are anticipated

Level 4: MCS life cycle composite tropics-wide



Synthetic data using GERB and the MT sampling
METEOSAT area for JJAS 2009



Not enough sampling of oceanic storms
in this case

Courtesy T. Fiolleau et al

Short term plan for the futur



Short term plan for the futur



Finalize the comparison with CERES PAPS data

Start the comparison with GERB data

Publish ATBDs and references (technical memorandum/ papers)

Monitor the status at <http://megha-tropiques.ipsl.polytechnique.fr>

Data (L1) release beyond the International Science team : early 2013

Products (L2+) release beyond International Science team : **ASAP**

Monitor the status at <http://www.icare.univ-lille1.fr/mt>

Indo-french (closed) workshop in mid-december in Bangalore, India

International Megha-Tropiques conference 2nd semester 2013 (tbc)

Thanks for your attention !